

NOTES ON SOLANUM (SOLANACEAE) IN AUSTRALIA

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Summary

Solanum callium sp. nov. ($2n=48$) occurs in north eastern New South Wales and south eastern Queensland. Typification of *S. villosum* Miller, *S. americanum* Miller and *S. gracile* Dunal is discussed.

Solanum callium C. T. White ex R. J. F. Henderson, species nova *S. superficiali* Adelbert affinis sed floribus paucioribus magnioribus, in inflorescentia supra-axillari portatibus, fructibus magnioribus in pedicellos longiores nutantes portatibus, foliis papyraceis tenuioribus differt. **Typus:** $28^{\circ} 27'S$, $152^{\circ} 42'E$; ca 35 km NW of Kyogle, New South Wales, Dec 1968, *Henderson* H489 (flowers) (holotypus BRI 178893, isotypus BRI 178894, isotypi distribuendi K, NSW, CANB); $28^{\circ} 18'S$, $152^{\circ} 55'E$, Levers Plateau, Qld/N.S.W. border, ca 90 km SSW of Brisbane, Apr 1972, *Henderson* H1289 (fruits) (paratypi BRI 198961/2, isoparatypi distribuendi K, NSW, CANB).

Frutex inermis, usque ad 5 m altus; caules glabri usque ad 5 cm diam. Folia solitaria vel aliquando bina (ubi subaequalia vel disparia), anguste lanceolata vel anguste elliptica, utrinque opacoviridia sed subtus leviter pallidiora; in planta viva textura papyracea, margine \pm undulata, et nervis lateralibus subtus elevatis, in speciminibus siccis textura tenuiter papyracea (paene membranacea) et nervis praecipuis tenuibus et \pm utrinque similibus; apice acuta, basi cuneata in petiolum angustata; supra glabra, infra glabra praeter pilis simplicibus paucis secus costam et venas principales vel tantum in junctura costae venis primariis vel omnino decalvata, guttis numerosis minutis \pm elevatis opacis saepe praeditis; lamina (2.5-)8-16(-23.5) cm longa, (1.3-)3-6(-8.5) cm lata; petiolus 0.5-4 cm longus. Inflorescentiae supra-axillares, cincinnorum simplicium (vel raro compositorum ordinis primi), floribus ca 9(-15 vel -30 ubi pedunculum furcatum) sed flores plerumque cadentes cicutrices conspicuae pedunculis relinquentes; pedunculi simplices (vel raro 1-furcati) erecti vel ascendentes, 0.5-1 cm longi ad florescentiam in fructo usque ad 3 cm longi; rhachis recurva, internodiis condensatis; pedicelli usque ad 1 cm, usque ad 3 cm longi post florescentiam elongati et in fructo nutantes, expansi abrupte apicem versus sed subtus fructum \pm constricti. Calyces ad florescentiam campanulati, in fructo applanati fructus subtendentes; tubus brevis, ca 2 mm longus; lobi \pm semicirculares, obtuse, 0.4-1 mm longi, 1.4-1.6 mm lati. Corollae albae; tubus 2-3 mm longus; lobi ovati-lanceolati, venatione reticulata conspicua, acuti, ca 5-7 mm longi, 3-4 mm lati, glabri, aliquantum coriacei, apicem versus cucullati papilloso. Ovarium glabrum, stylus rectus, 5-6 mm longus, 2-3.5 mm antheras excedens. Stamina 3-4 mm longa; antherae 2.6-3.7 mm longae, atro-aurantiicae, in ambitu ellipticae. Pollina (19-)20-24 μ diam. Baccae 1-5 in infructescentiis omnis, globosae, atro-aurantiicae, polyspermae, carnosae, aliquantum nitidae, 1-1.5(-2) cm diam.; semina oblique reniformia, plana, 3-4 mm longa, 2-3 mm lata, straminea. Chromosomatum numerus $2n=48$.

Shrub without prickles, up to 5 metres tall; stems slender, glabrous, up to 5 cm diameter. Leaves solitary or sometimes two together (where sub-equal or unequal in size), narrowly lanceolate or narrowly elliptic, on both sides dull green but slightly paler below, in the living plant thin textured, the margins \pm undulate and the lateral nerves raised on the undersurface, in dried specimens papery textured (almost membranous) with main nerves fine and \pm similar on both surfaces; apex acute; base cuneate, drawn out narrowly along the petiole;



Plate 1. Holotype of *Solanum callium* C. T. White ex R. J. Henderson.

upper surface glabrous, lower surface glabrous except for a few simple hairs alongside the midrib and principal nerves or only at the junction of midrib and principle nerves or becoming completely glabrous, often marked with numerous minute \pm raised opaque spots; lamina (2.5-)8-16(-23.5) cm long, (1.3-)3-6 (-8.5) cm broad; petiole 0.5-4 cm long. Inflorescences supra-axillary, of simple (or rarely first order compound) cincinnal cymes, *ca* 9 (-15 or -30 when peduncle branched)-flowered, but flowers mostly caduous leaving conspicuous scars on the rhachis; peduncle simple (or rarely once forked), erect or ascending, 0.5-1 cm long in flower, to 3 cm long in fruit; rhachis recurved, internodes condensed; pedicels to 1 cm in flower, in fruit to 3 cm long, nutant, abruptly thickened towards the top but somewhat constricted under the fruit. Calyx in flower campanulate, in fruit flattened and subtending the fruit; tube short, *ca* 2 mm long; lobes \pm semi-circular, obtuse, 0.4-1 mm long, 1.4-1.6 mm broad. Corolla white; tube 2-3 mm long; lobes ovate-lanceolate, conspicuously reticulately veined, acute, *ca* 5-7 mm long, 3-4 mm broad, glabrous, coriaceous, at the tip cucullate, papillose. Ovary glabrous; style straight, 5-6 mm long, exceeding the tips of the anthers by 2-3.5 mm. Stamens 3-4 mm long; anthers 2.6-3.7 mm long, dark golden yellow, elliptic in outline. Pollen (19-)20-24 μ across. Berries 1-5 in each infructescence, globose, orange-yellow, many seeded, fleshy, somewhat shining, 1-1.5(-2) cm in diameter; seed obliquely reiform, flat, 3-4 mm long, 2-3 mm across, stramineous. Chromosome number $2n=48$.

This species appears to belong to *Solanum* subgenus *Solanum* section *Leiodendra* Dun. (Dunal, Sol. Syn. 20:1816).

QUEENSLAND. **Moreton District:** Riverview, Mar 1957, *Philp* 57/217 (BRI); Levers Plateau on Qld/N.S.W. border, *ca* 90 km SSW of Brisbane, Apr 1972, *Henderson* H1289, H1300 (BRI). NEW SOUTH WALES. **North Coast:** Lismore, Feb 1891, *Bauerlen* NSW 72067 (NSW); Alstonville, Nov 1910, Apr 1913, *Tomlins* NSW 72070, NSW 72071 (NSW); Marshall Falls, Alstonville, Dec 1911, *Tanner* 65 (NSW); Sandiland Ranges, Nov 1904, *Boorman* NSW 72072 (NSW); Toonumbar, near Kyogle, Mar 1944, *C. T. White* 12557 (BRI), Dec 1946, *Hayes* (BRI); Toonumbar State Forest, Apr 1947, *Constable* NSW 71565 (NSW); Whian Whian, near Lismore, Jun 1945, *C. T. White* 12855 (BRI), Mar 1966, *W. T. Jones* 3166 (BRI); Mount Glennie slopes, Macpherson Range, Jan 1953, *Constable* (BRI): 28° 27'S, 152° 42'E, *ca* 20 miles NW of Kyogle, Dec 1968, Feb 1972, *Henderson* H489, H1259 (BRI).

Specimens from the National Herbarium of New South Wales, Sydney, have been examined through the courtesy of the then Director, Mr. K. Mair. They are designated by (NSW) in the citations above.

This species was recognized by C. T. White, a past Government Botanist in the Queensland Herbarium, and was tentatively named *S. callium* and described in manuscript by him. The name remained unpublished since his death in 1950 and only now is published in the light of my researches and promising results obtained from chemical analyses carried out on the plant by Prof. J. Swan and colleagues at Monash University, Melbourne (*Bird et al.*, 1976). Though the epithet "callium" was proposed by White, the description above is solely mine. It is probably derived from the Greek Καλλος (Kallos) meaning beauty, probably an allusion to the fine stature and appearance of the plant.

S. callium is very closely related to *S. superficiens* described from Java and southern Sumatra in Indonesia, and when that species is better known, may be found to represent only a subspecies of it. I have received on loan through the courtesy of the Director, Rijksherbarium, Leiden, the holotype and paratypes cited by Adelbert (1948) and three other specimens subsequently identified as *S. superficiens* but not by Adelbert. These latter three are so different from the rest that they appear to be misidentified.



Plate 2. A paratype of *Solanum callium* C. T. White ex R. J. Henderson.

Of the six type sheets, the holotype (*Smith* 641) is atypical of the set in a number of characteristics (and is noted as such in two instances in the protologue by Adelbert), though they all possibly belong to the one species. Our plants are morphologically most like the holotype specimen (unfortunately only in very young bud and with only two fruits) but differs from it principally in the fewer flowers in supra-axillary usually simple cincinnal cymes, in the fruiting stage often leaf opposed or at least well away from the leaf axils, the larger fruits on longer, pendulous pedicels and the thinner textured leaves. On the little evidence available, *S. callium* may have a different flowering period from *S. superficiens* (flowers December–March, fruits February–June in *S. callium*; in buds and fruits in September in *S. superficiens* (type)) though the geographic distance and differences in latitude separating them perhaps make comparisons unwarranted. *S. callium* seems to differ from *S. superficiens* also in chromosome number. From mitoses in anther tissue (voucher H489, BRI 178893/4) I have established a somatic chromosome number of 48 in our species whereas Gerasimenko and Reznikova (1968) record $2n=24$ for *S. superficiens*. However, I have not examined any vouchers for the identity of their material grown from seed from Bogor, Java (Vilar accession No. 36212).

The similarity of *S. callium* material to certain specimens of *Solanum* from Mexico and Central America in NSW was pointed out to White by the late Mr. R. H. Anderson of the New South Wales National Herbarium. This may have accounted for White's failure to proceed with formal description of his material but on examination of the specimens referred to by Anderson, I find that though a close similarity does exist with one of them (*Pringle* 6837 [NSW 85255] from Barranca near Cuernavaca, Mexico, identified as *S. triste* Jacq. but most likely a specimen of *S. nudum* H.B.K. ex Dun. or *S. antillarum* O. E. Schulz) our plant differs significantly from it in a number of characters especially the fewer larger flowers, the longer anthers with larger pollen grains (15–20 μ across in *Pringle* 6837, 19–24 μ across in *S. callium*), the lack of branched hairs on the leaves and the glabrous ovary. Our plants fit neither description of the above species in D'Arcy's account of Solanaceae in Panama (D'Arcy, 1974) and Dr. D'Arcy, who has seen material of our plant, states (in correspondence) that it does not resemble anything he has seen from Central or northern South America. Mr. D. Blaxell, who at my request compared duplicates of my collections (sent as *S. superficiens*) in K and ones sent to K by C. T. White (as *S. callium*, C. T. White 12855) with holdings of *Solanum* at BM stated in correspondence that "there is nothing in the BM Carribean material which even remotely resembles the *S. superficiens* from Australia". The type specimen of *S. nudum* (P, not seen; IDC 6209-2.61 : I.5) appears to have shorter broader more thickly textured leaves and smaller fruit on shorter pedicels than in our plant. I have not seen any of the syntypes of *S. antillarum*.

The origin of *S. callium* remains in some doubt. Because of its similarity to *S. superficiens* and to other species of *Solanum* from Central America, its relatively restricted distribution and the lack of any seemingly closely related Australian species, it might be considered an introduction of unknown origin that has been able to persist in certain habitats in northern New South Wales and southern Queensland. If this is in fact the case, it may have been described previously. On the other hand, where seen in the field, *S. callium* occurs in small but definite populations, usually only on north-facing slopes at altitudes above about 500 m, in essentially undisturbed rainforest margins and clearings which show few, if any, signs of incursion by naturalized

weedy species. It seems as much a part of the natural vegetation as the native *S. aviculare* Forst. f. does in such habitats. If introduced, it has not, in the three quarters of a century or more it has been here, spread as might be expected of a persistent weedy introduction in such habitats with high moisture supply, moderate temperatures, fertile soils and abundant available light.

Its occurrence as late as 1957 at Riverview (presumably in the largely settled area between Ipswich and Brisbane where the habitat would be most atypical for *S. callium*) is inexplicable. If label data has been correctly interpreted, it may point to the species being introduced. However, cuttings grown in the glasshouse and later transplanted outdoors in Brisbane failed to prosper and died quite rapidly.

The species most likely to be confused with *S. callium* in Australia are *S. aviculare* Forst. f. and its allies (including *S. vescum* F. Muell. and *S. linearifolium* Herasimenko), *S. pseudocapsicum* L. and perhaps *S. viride* R.Br. From the former group it is clearly distinguished by its pure white flowers and light green entire leaves and stem tips (as opposed to lilac to purple flowers and dark green to purplish stems and usually conspicuously lobed leaves at least in the first two species). *S. viride* from North Queensland is distinguished from it by the lilac flowers in large usually compound cymes with petals always stellate pubescent on the outer surface and the smaller pisiform fruit. *S. pseudocapsicum*, an introduced, widely naturalized species with white flowers and orangy-red fruits, is much smaller in stature (in Australia rarely attaining more than 1.5 m in height) and has only one or two flowers per inflorescence each succeeded by a fruit about 1.5 cm across but borne on an erect pedicel and subtended by a calyx with subulate lobes.

***Solanum villosum* Miller, Gard. Dict. ed. 8 : no. 2 (1768).**

In my recent account of this and related species in Australia (Henderson, 1974 p. 54), I misquoted details regarding the nomenclatural type of the above species. There is a sheet with a specimen of *S. villosum* in the British Museum (Natural History) to which I referred, which carries the following labels:—

- (a) A rectangular label on which is written by an unknown hand "692. *Solanum officinarum* acinis puniceis C.B. 166. 1735". [C.B. 166=Caspar Bauhin, *Pinacis Theatri Botanici* etc. p. 166, 1623. This specimen 692 was grown and collected in 1735. See also Britten, 1913].
- (b) A printed label attached to (a) stating "Plants from Chelsea Physick Garden sent to the Royal Society in accordance with Sir Hans Sloane's Deed of Conveyance to the Apothecaries Company 1722-96."
- (c) A label on which is printed "Type Specimen" and carrying the following handwritten unsigned notation: "Solanum officinarum, acinis puniceis of Miller, Chelsea Garden 1735, which became *Solanum villosum* (non L.) Miller Dict. no. 2, 1768".
- (d) An annotation pencilled in an unknown hand ". *miniaturum* Bernh.
Solanum villosum Mill. Dict no. 2!"

In addition the sheet is stamped "Chelsea Garden" on the reverse.

This specimen is obviously therefore not from Miller's herbarium as I stated but one of the specimens sent from the Chelsea Physic Garden under Sir Hans Sloane's Deed of Conveyance during Miller's time there. In spite of this, it need not necessarily be excluded from consideration as type of a Miller name as Britten (1913) would have all such specimens.

Dr. W. T. Stearn of the British Museum (National History) stated (per. comm.) that these specimens are an indication of plants growing in the Chelsea Physic Garden during Miller's curatorship and as such warrant careful consideration when seeking to typify Miller's species names (see also Stearn's published comments to Barclay regarding typification of Miller's *Datura* names (Barclay, 1959) and Stearn, 1972).

Miller stated in the preface to the seventh (1759) edition of his Dictionary that ". . . here it is but doing Justice to the Work, to observe, that the Descriptions given of the Plants are not copied from Books, but are taken from Nature. The far greater Number are from the growing Plants, which the Author has under his Care, and the others are from dried Samples, which are well preserved; of which he has, perhaps, as large a Collection as can be found in the Possession of any private Person." There is no reason to doubt that the same applied to edition eight and for that matter any of the earlier editions of his Dictionary.

Thus, nomenclatural types of Miller's names are specimens (if such exist) and not illustrations or plates (or specimens on which these were based) or descriptions in the works of other authors.

Specimens in Miller's own herbarium are of first consideration for in his own (printed) words, these could have been the actual specimens from which his descriptions were drawn up.

Miller's specimens in the Sloane herbarium are of second consideration for these are of plants grown under his care which according to Dandy (p. 167) and Britten (p. 134), Sloane stated were "gathered, dried and fastened by Miller". There is however, no certainty that they formed the basis for the description in his dictionaries.

Of third and perhaps least importance are the Chelsea plants sent at Sloane's direction to the Royal Society during Miller's time there (i.e. up to no. 2400 which was transmitted in 1769). There is no guarantee that Miller actually saw these particular plants but at least they are of plants grown in the Garden under his care which he said formed the principal basis for his descriptions.

Britten (1913) detailed the history and fate of the Miller herbarium which is now housed in the general collection of the British Museum (Natural History).

With regards typification of *S. villosum*, I believe there is no specimen labelled as such or as *Solanum officinarum*, *acinis puniceis* from the Miller herbarium in BM. According to Mr. D. Blaxell, there are no specimens labelled with either of the above names in the Sloane Herbarium either. Chelsea plant 692 above now comes under consideration for typification of *S. villosum*. It is labelled as *Solanum officinarum acinis puniceis* and was collected in 1735. In edition 2 of Miller's Dictionary (1733), the second species dealt with under *Solanum* was *Solanum officinarum acinis puniceis*. It seems logical to believe that the identification of a Chelsea Garden specimen collected only two years after the appearance of the Dictionary would have been correct. It is not discordant with the protologue description.

Strictly speaking this specimen can only be chosen as lectotype if it is certain that Miller actually saw the specimen (ICBN: Guide for the Determination of Types 4a). Since this will never be known, it is probably more precise to designate it as a neotype. I here reaffirm selection of this specimen as type but redesignate it neotype.

Solanum gracile Dunal in DC., Prodrromus 13 (1):54 (1852).

With respect to Australian plants identified as *S. gracilius* Herter in my previous account (Henderson, 1974), typification of Dunal's *S. gracile* was critical. In my paper, published on 2 September 1974, I nominated a specimen grown in the Montpellier Gardens and preserved in the De Candolle herbarium as lectotype (IDC 800-61.2063:III.7). In his account of Solanaceae for the Flora of Panama, issued on 3 July, 1974, D'Arcy cited as type of *S. gracile* Dunal, "Hort. Monsp. 1831 (MPU)", without any explanation as to what kind of type this specimen was or any discussion on the material.

In the protologue to *S. gracile* (excluding *S. gracile* var. *microphyllum*) Dunal cited five specific herbarium collections (four in "h. Mus. Paris" (=P) and one in "h. DC."), and stated that the species was grown from seed "in hort. Monsp. et Genev." He further stated at the end of the species description that he had studied dried material "-in h. DC. h. Mus. Paris-" and had seen living plants. Dunal cannot be credited with nominating a holotype (citation of "hort Berol. e sem. hort. Monsp". after the name is merely an indication of the origin of the name, a fact which is verified by a note on one of the syntypes in G-DC (Henderson, 1974 p. 48)). All specimens cited and referred to in the protologue are therefore syntypes. I cannot see that any herbarium material in MPU whether collected, labelled or determined by Dunal can strictly qualify for syntype status. At best they may be proved to be iso-syntypes.

The 1972 International Code of Botanical Nomenclature (ICBN)—Guide for Determination of Types states under 4a that "a lectotype must be chosen from among elements that were definitely studied by the author up to the time the name of the taxon was published *and included in the protologue*" (italics mine), and under 4c that ". . . If no holotype was designated by the original author and if syntypes exist, one of them must be chosen as the lectotype" (see also Article 7).

For these reasons I reject D'Arcy's citation as an incorrect citation of the type of *S. gracile* Dunal. This may seem trivial since D'Arcy (*l.c.*) synonymized *S. gracile* Dunal (and *S. douglasii* Dunal) under *S. nigrescens* Mart. & Gal. in his account. From my experimental work (Henderson, *l.c.*) living plants of *S. douglasii* (as typified by the holotype in G-DC) and those of *S. gracilius* (= *S. gracile* as typified by my previous lectotypification) are clearly of morphologically distinct species and can be distinguished even in the dried state. I have stated why I do not accept *S. nigrescens* for plants of *S. douglasii*.

In addition, D'Arcy (1974b) formally described specimens of plants cultivated in New Zealand, as *S. americanum* var. *baylisii* and indicated that this is the taxon that Baylis in 1958 considered was *S. gracile* Dunal. From his protologue they appear identical with ones I grew from seed sent from Professor Baylis as *S. gracile* (BRI) which I considered were conspecific with Dunal's species (as Baylis did) and the specimen selected by me as lectotype of *S. gracile* Dun. The characteristics given by D'Arcy to distinguish his variety from *S. americanum* var. *americanum* are well within the normal range of variation of *S. gracilius*. I therefore treat *S. americanum* var. *baylisii* as a synonym of *S. gracilius*.

Solanum americanum Miller, Gard. Dict. ed. 8 : no. 5 (1768).

In my recent account of *S. nigrum* and related species in Australia, I considered Australian plants of *S. nodiflorum* Jacq. subsp. *nodiflorum* were taxonomically distinct from those of *S. americanum* as lectotypified by Edmonds (1972). My reasons for this were fully explained.

D'Arcy (1974a, 1974b) apparently ignored Edmond's lectotypification of *S. americanum* for he cited as type "authentic specimens Herb. Sloane 295, 14", without any discussion or comment.

The ICBN-Guide for the Determination of Types (1972) states under 4f that "the first choice of a lectotype must be followed by subsequent workers unless the original material is rediscovered, or unless it can be shown that the choice was based upon a misinterpretation of the protologue, or if the choice was made arbitrarily (e.g., by a mechanical system) and without understanding of the group concerned."

From the protologue to *S. americanum* it is impossible to say conclusively that Edmond's lectotypification was incorrect under any of these categories and therefore cannot be set aside. As stated previously the material in Miller's own herbarium is of first consideration in typification of Miller's names, that in the Sloane herbarium is of secondary consideration. I therefore reject D'Arcy's citation of the type as being incorrect.

Acknowledgements

I wish to acknowledge the assistance received from Mr. D. F. Blaxell of the National Herbarium of New South Wales (NSW) while Australian Botanical liaison officer at Kew (K) in 1974/75. Mr. Blaxell compared specimens and supplied promptly photocopies of protologues and relevant literature. Mr. D. McGillivray, also of NSW, kindly arranged for photocopies of certain protologues while Liaison officer at K in 1968/69. Mr. D. Symon (ADW) and Mr. L. Pedley (BRI) also kindly compared specimens of *S. callium* with specimens in K at my request and commented on their findings.

Bibliography

- ADELBERT, A. G. L. (1948). Notes on the Flora of Java 4. *Blumea* 6:310-336.
- BARCLAY, A. S. (1959). New Considerations in an old Genus : DATURA. *Bot. Mus. Leaflets Harvard Uni.* 18(6):245-272.
- BIRD, G. J., COLLINS, D. J., EASTWOOD, F. W., GATEHOUSE, B. M. K. C., JOZSA, A. J. & SWAN, J. M. (1976). New steroidal Alkaloids from *Solanum callium*. *Tetrahedron Letters* no. 40:3653-3656. Pergamon Press: Great Britain.
- BRITTEN, J. (1913). Philip Miller's Plants. *J. Bot.* 51:131-135.
- DANDY, J. E. (1958). *The Sloane Herbarium*. London: Trustees of the British Museum.
- D'ARCY, W. (1974a) ('1973'). Solanaceae in Flora of Panama Part 9. *Ann. Missouri Bot. Gard.* 60(3):573-790.
- D'ARCY, W. (1974b). *Solanum* and its close relatives in Florida. *Ann. Missouri Bot. Gard.* 61(3):819-867.
- EDMONDS, J. M. (1972). A Synopsis of The Taxonomy of *Solanum* sect. *Solanum* [Maurella] in South America. *Kew Bull.* 27(1):95-114.
- GERASIMENKO, I. I., & REZNIKOVA, S. A. (1968). A Cytological Investigation of the Genus *Solanum* L. *Bot. Zurn.* 53:505-513. Index to Plant Chromosome numbers for 1968. *REG. VEG.* 68:74(1970).
- HENDERSON, R. J. F. (1974). *Solanum nigrum* L. (Solanaceae) and Related Species in Australia. *Contr. Qd Herb.* 16.
- STEARNS, W. T. (1972). Philip Miller and the Plants from the Chelsea Physic Garden presented to the Royal Society of London, 1723-1796. *Trans. Bot. Soc. Edinb.* 41(3):293-307.